METHOD FOR PROCESSING AUDIO/VIDEO DATA WITHIN AN AUDIO/VIDEO DISK DRIVE, AND CORRESPONDING DRIVE

Field of the Invention

[0001] The present invention relates to processing audio/video data, and more particularly, to decoding data compressed according to the MPEG4 compression standard.

Background of the Invention

[0002] At the present time, multi-function digital disk drives, and particularly audio/video disk drives (for DVD disks) are designed to decode data compressed according to the MPEG2 standard. It is also possible to have digital disks, for example CD ROM disks, containing audio/video data compressed according to the MPEG4 standard.

Summary of the Invention

[0003] In view of the foregoing background, an object of the present invention is to use a DVD disk drive to decode data according to the MPEG4 standard, even if the drive was not originally designed to decode such data. This is done without the need to modify the decoding software already installed on the DVD drive. In particular, the installed software may be designed to decode data compressed according to the MPEG2 standard.

[0004] This and other objects, advantages and features in accordance with the present invention are provided by a method for processing audio/video data in an audio/video disk drive in which the drive is equipped with an electronic chip comprising main processing means for decoding data compressed according to a first compression standard, for example the MPEG2 standard, and an input/output interface, for example a generic external memory interface with a maximum predetermined data transfer rate.

[0005] According to one general characteristic of the invention, when encountering data compressed according to a second compression standard, for example the MPEG4 standard defining a compressed data rate that is less than the maximum transfer rate of the input/output interface and a decoded data rate greater than the maximum transfer rate, the compressed data are transferred to the auxiliary processing means through the input/output interface. The compressed data are decoded within the auxiliary processing means, and the decoded data are then encoded according to the first compression standard. The data thus encoded are transferred to the main processing means for decoding.

[0006] In other words, the invention uses an input/output interface not designed for this purpose as the means of transferring compressed data, for example an external memory interface normally designed to connect the additional memory to the main processing means. The method decodes data compressed for example according to the MPEG4 standard, external to the main processing means in the DVD disk drive, and then re-encodes the decoded data according to the MPEG2 standard before transferring the data through the

memory interface for decoding in the main processing means.

[0007] According to one embodiment, the auxiliary processing means can only encode "intra" images with a lower compression ratio, and with a simpler encoding.

[0008] Another aspect of the present invention is directed to an audio/video disk drive comprising reception means capable of receiving an audio/video digital disk, an electronic chip connected to the reception means and comprising main processing means for decoding data compressed according to a first compression standard, and an input/output interface, for example a generic external memory interface with a predetermined maximum data transfer rate.

[0009] According to one general characteristic of the invention, the digital audio/video disk may contain data compressed according to a second compression standard defining a compressed data rate less than the generic interface transfer rate, and defining a decoded data rate greater than the transfer rate. The drive may comprise auxiliary processing means connected to the input/output interface for decoding data compressed according to the second compression standard, and for encoding data decoded according to the first transmission standard. The main processing means may transfer data compressed according to the second compression standard through the input/output interface, and then decode the corresponding data encoded according to the first compression standard by the auxiliary processing means, and then transfers the decoded data through the input/output interface.

Brief Description of the Drawings

[0010] Other advantages and characteristics of the invention will become clear after reading the detailed description of an embodiment and method of use that is in no way restrictive, with reference to the appended drawings, wherein:

[0011] Figure 1 diagrammatically illustrates the internal architecture of a drive according to the present invention;

[0012] Figure 2 illustrates in more detail the internal architecture of an additional component according to the present invention built into the drive; and

[0013] Figure 3 shows the image types used in the MPEG standard.

Detailed Description of the Preferred Embodiments

[0014] In Figure 1, the LDVD reference denotes a DVD. Conventionally, it comprises reception means MR (specific interface) used to receive the digital disk, and a main chip PCP comprising main processing means MTP implemented by software within a processor. In this case, the main processing means MTP are capable of decoding data compressed according to the MPEG2 standard.

[0015] The main processing means MTP interfaces with a video memory MMP. In this example, the main chip PCP also comprises a generic external memory interface EMI that was originally intended to hold the additional memory.

[0016] The DVD drive according to the invention further comprises an additional chip PCA also equipped with an EMI interface compatible with the EMI interface

of the main chip PCP. The additional chip PCA also comprises auxiliary processing means MTA for decoding data compressed according to the MPEG4 standard, and for re-encoding the data according to the MPEG2 standard. In this respect, an additional video memory MMA is provided.

[0017] In general, the rate transferred through the EMI interface is very limited. Thus, for example, a maximum data transfer rate may be on the order of 10 Mbytes/s. Furthermore, images compressed according to the MPEG4 standard use a compressed data rate on the order of 1 to 2 Mbytes/s. However after decoding, the decoded data rate is 30 Mbytes/s.

[0018] Furthermore, in the presence of a DVD disk inserted in the reception means MR and containing data compressed according to the MPEG4 standard, the main processing means MTP will recover the data and then transfer the data to the additional chip PCA through the generic external memory interface EMI. This is possible since the transfer rate of data compressed according to the MPEG4 order is less than the maximum data transfer rate through the EMI interface. Upon reception of the data encoded according to the MPEG4 standard, the auxiliary processing means MTA will decode the data and will then re-encode the data according to the MPEG2 standard.

[0019] The transfer rate of data compressed according to the MPEG2 standard is on the order of 7 Mbits/s. Therefore, this transfer rate is much less than the maximum transfer rate through the EMI interface. Data encoded according to the MPEG2 standard are then returned to the main chip PCP to be decoded by the main processing means MTP.

[0020] Thus, the invention enables decoding of data compressed according to the MPEG4 standard without any change to software already present in the main processing means MTP which is provided to only decode data compressed according to the MPEG2 standard.

[0021] As illustrated in Figure 2, the auxiliary processing means MTA may be implemented by software within a processor, for example. Furthermore, it is intended that conventional arbitration means ARB will arbitrate between the main processing means MTP and the auxiliary processing means MTA.

[0022] A clock generator CGEN outputs the clock signal(s) necessary for correct operation of the PCA chip. Furthermore, an interface is provided with the additional video memory MMA, in addition to the EMI interface with the main processing means MTP. Finally, a register RG will be used to temporarily store the IRQout interrupts output by the auxiliary processing means MTA.

[0023] The auxiliary chip PCA also receives the interrupts IRQin output by the main processing means MTP and the addresses A of the video memory. The letter D denotes the data bus and the references STB, REQ, ACK denote conventional control signals between processors.

[0024] The MPEG standard defines three types of images that are sequenced according to the diagram shown in Figure 3. More precisely, the images I (intra) are encoded without any reference to the other images. In other words, they contain all elements necessary for reconstruction by the decoder. The compression ratio of the images I is relatively low.

[0025] The other images are P (predicted) images that are encoded with respect to the I or P type image

described above using prediction techniques with movement compensation. Finally, the B (two-directional) images are encoded by interpolation between the previous and following I or P type images that surround them.

[0026] Since the compression ratio of the I images is relatively low, it is easier to encode them by the auxiliary processing means MTA. For example, this is why it would be possible to re-encode the decoded images using the I images only. This will give a higher rate of encoded images than if encoding was done using I, P and B images according to the standard. However, this transfer rate of encoded I images will remain largely compatible with the maximum transfer rate of the EMI interface.